

Title: Polynucleotide Sequence Encoding Cysteine Protease for Modulation
of Coffee Flavour Precursor Levels in Green Coffee Grains (*as modified*)
Inventor: McCarthy, *et al.*
App. No.: 10/559,986
Docket No.: 112701-667
REPLACEMENT DRAWING

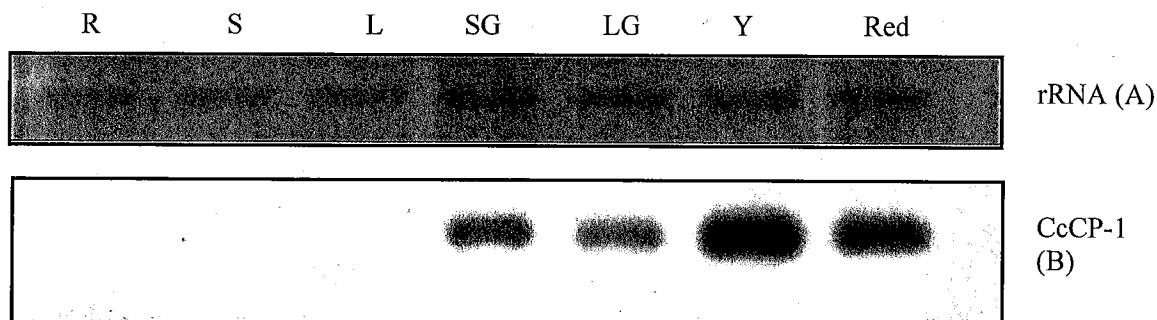


Figure 1: Northern blot analysis of the expression of the cysteine proteinase (CcCP1) gene in different tissues of *Coffea arabica*.

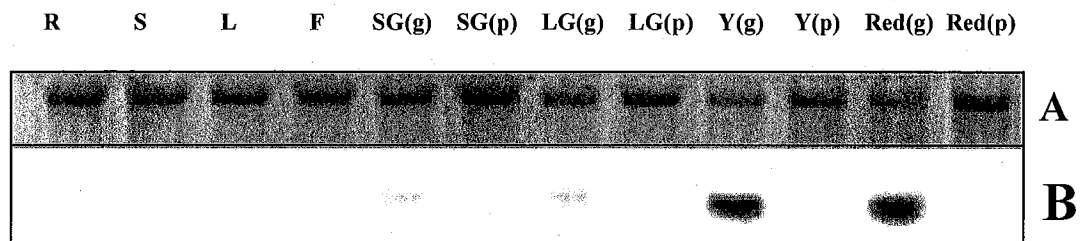


Figure 2A: Northern blot analysis of the expression of the Cysteine proteinase CcCP-1 gene in different tissues of *Coffea arabica*.

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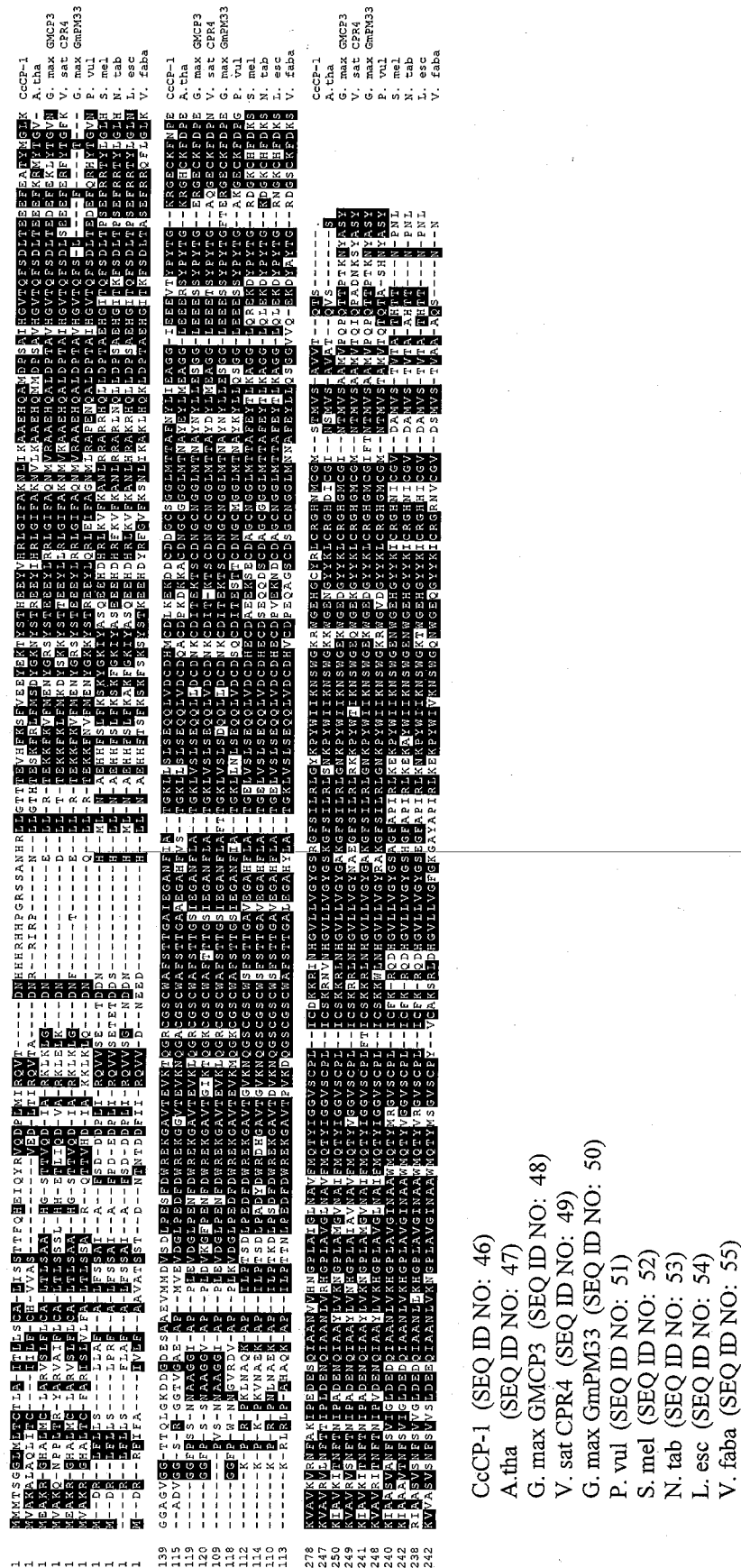


Figure 2B: Alignment of the full sequence of the protein encoded by CcCP-1 cDNA with other full-length cysteine proteinases available in the NCBI database.

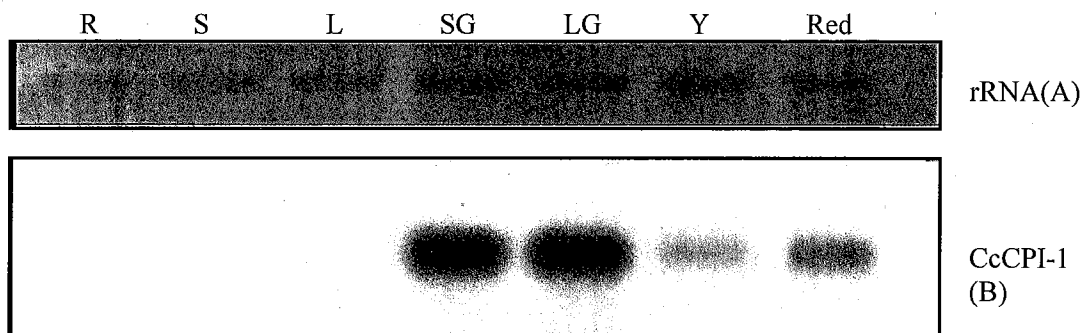


Figure 3: Northern blot analysis of the expression of the cysteine proteinase inhibitor (CcCPI-1) gene in different tissues of *Coffea arabica*.

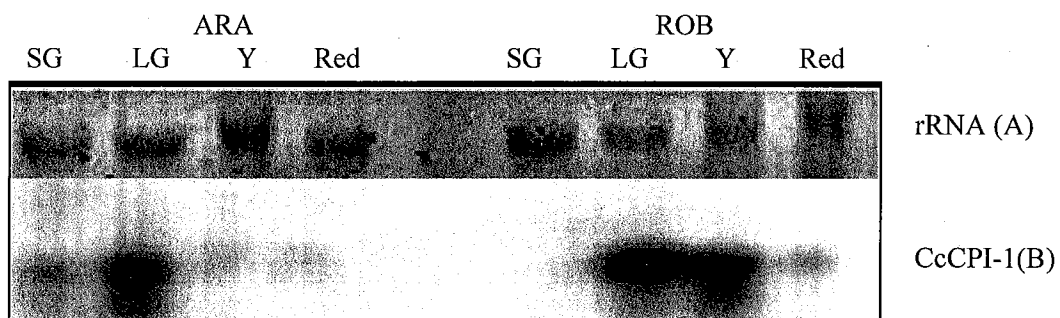


Figure 4: Northern blot analysis of the expression of the cysteine proteinase inhibitor gene (CcCPI-1) at different cherry development stages for *Coffea arabica* (ARA) and *Coffea canephora* (ROB).

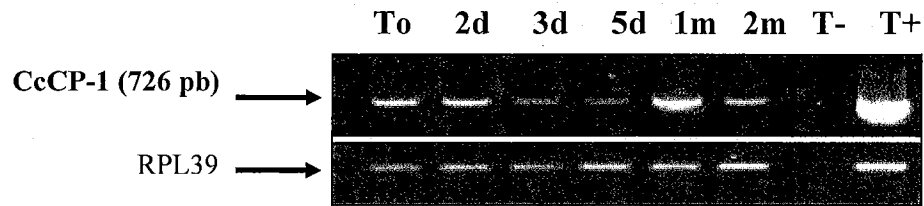


Figure 5. RT-PCR analysis of the expression of *CcCP-1* during *Coffea arabica* grain germination.

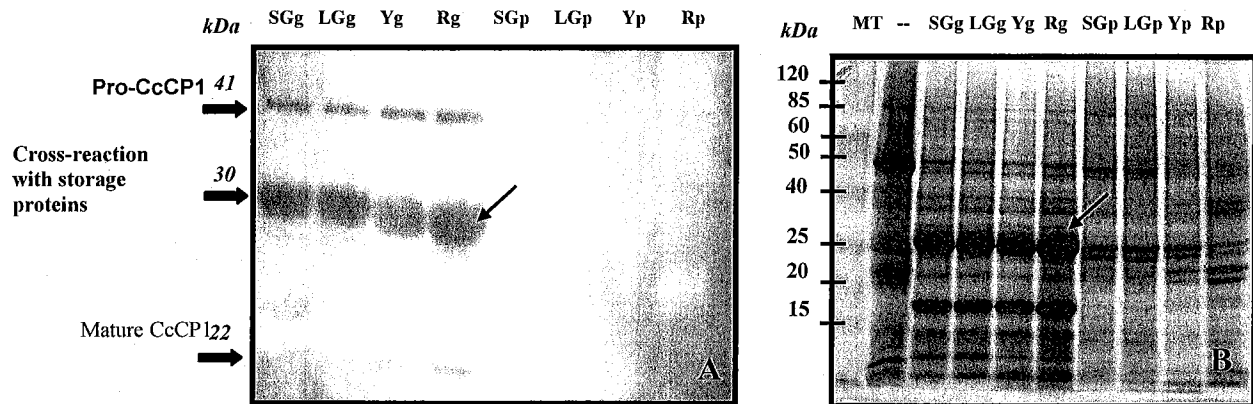


Figure 6A: Western-blot analysis of the expression of *CcCP1* protein (A).

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1	M	S	K	L	P	I	T	F	F	I	S	L	S	L	F	L	V	A	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	I	P	G	G	R	T	K	V	K	N	V	K	T	D	T	E	Sunflower	
1	M	A	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	I	G	G	I	K	Q	V	E	G	S	A	N	S	L	E	R. obtusif		
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52	V	Q	E	L	G	E	Y	C	V	S	E	Y	N	K	S	L	R	K	K	-	-	-	-	-	-	-	-	-	-	-	N	N	E	S	G	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CPI-1		
40	V	Q	E	L	G	R	F	S	V	E	E	Y	N	R	Q	R	G	T	Q	-	-	-	-	-	-	-	-	-	-	-	K	M	D	G	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	M. dosmest			
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19	V	E	S	L	A	K	F	A	V	E	D	H	N	K	K	Q	N	A	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R. obtusif			
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93	G	I	K	Y	Y	L	K	I	K	A	T	T	S	S	G	V	P	K	V	Y	D	A	I	V	V	V	R	P	W	V	H	T	K	P	R	Q	L	L	N	F	S	P	S	P	A	T	K	-	-	-	-	-	CPI-1
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79	G	T	K	Y	Y	L	K	I	E	A	I	Y	K	G	K	M	K	V	F	D	A	E	V	V	V	Q	S	W	K	H	S	K	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Sunflower	
53	G	T	M	Y	Y	I	T	L	E	A	T	D	G	-	G	K	K	K	V	Y	E	A	K	V	W	V	K	P	W	M	N	F	K	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R. obtusif	
99	G	L	K	Y	Y	L	R	I	E	V	T	Q	P	N	G	S	T	R	M	F	D	S	V	V	V	I	Q	P	W	L	H	S	K	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A. thalian

CPI-1 (SEQ ID NO: 56)

M. dosmest (SEQ ID NO: 57)

Sunflower (SEQ ID NO: 58)

R. obtusif (SEQ ID NO: 59)

A. thaliana (SEQ ID NO: 60)

Figure 6B: Optimal alignment of the complete protein encoded by CcCPI-1 cDNA with other homologous full-length cysteine proteinases available in the NCBI.

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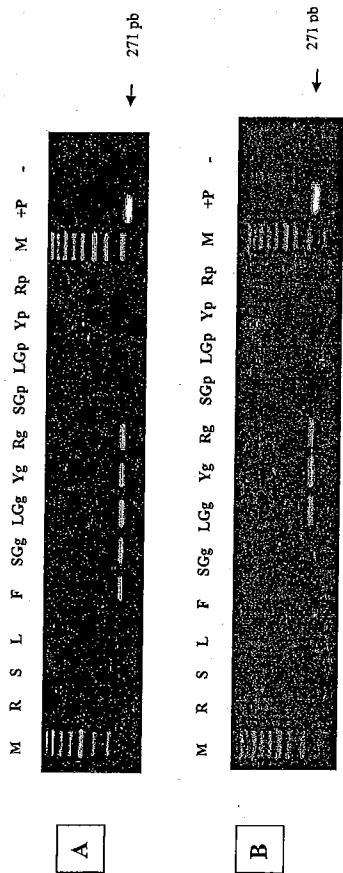


Figure 7: RT-PCR analysis of the expression of CcCPI-1 gene in different tissues of *Coffea arabica* CcCA2 (A) and *Coffea robusta* FRT-32 (B).

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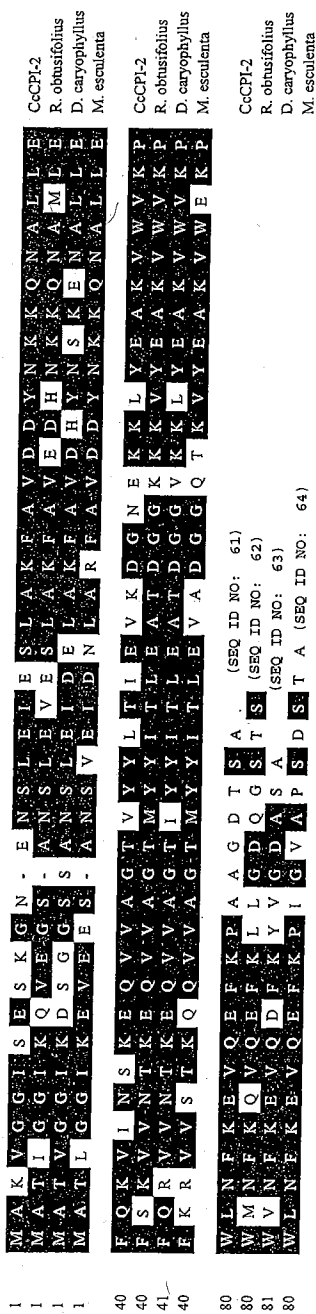


Figure 8: Optimal alignment of the complete protein encoded by CcCPI-2 cDNA with other homologous full-length cysteines proteinases available in the NCBI.

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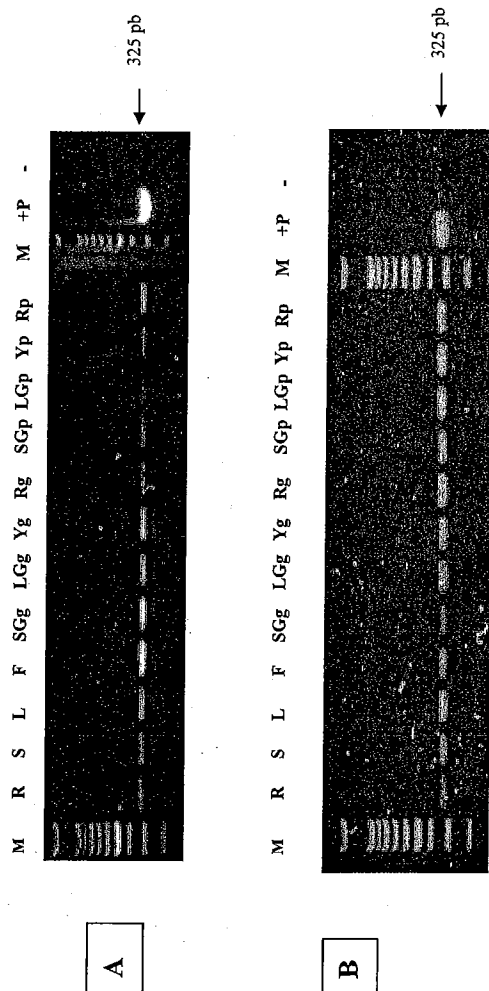


Figure 9: RT-PCR analysis of the expression of CcCPI-2 gene in different tissues of *Coffea arabica* CCA2 (A) and *Coffea robusta* FRT-32 (B).

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41	S	-	K	A	D	P	K	D	P	E	V	L	E	N	G	K	F	A	I	D	E	H	N	K	E	A	G	T	K	L	E	F	K	T	V	V	E	A	Q	K	CcCPL-3
33	K	P	I	E	D	P	K	E	K	H	V	M	E	I	G	Q	F	A	V	I	E	Y	N	K	Q	S	K	S	A	L	K	F	E	S	V	E	K	G	E	T	Citrus x paradisi
33	R	P	I	E	S	L	N	S	A	E	V	Q	D	V	A	Q	F	A	V	S	E	H	N	K	R	S	E	S	G	L	K	F	E	T	V	V	S	G	E	T	A. deliciosa
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72	Q	V	V	S	G	T	N	Y	R	L	K	V	A	A	N	D	G	D	G	V	S	K	N	Y	L	A	I	V	W	D	K	P	W	M	K	F	R	N	L	T	A. thaliana
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112	S	F	R	K	V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A. deliciosa		
112	S	F	E	P	A	N	N	G	R	F	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A. thaliana		

Figure 10: Optimal alignment of the complete protein encoded by CcCPL-3 cDNA with other homologous full-length cysteine proteinases available in the NCBI.

REPLACEMENT DRAWING

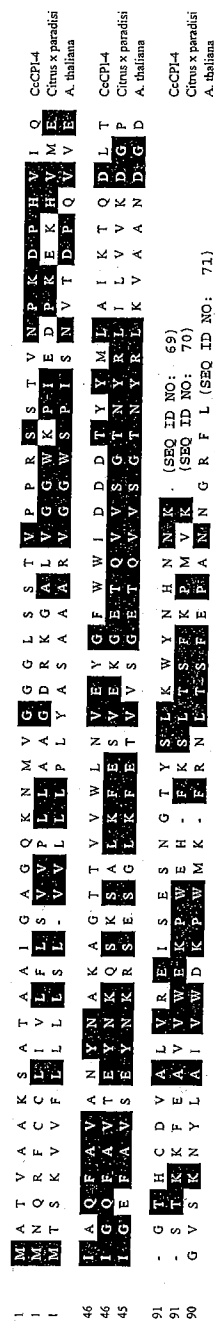


Figure 11: Optimal alignment of the complete protein encoded by CcCPL-4 cDNA with other homologous full-length cysteine proteinases available in the NCBI.

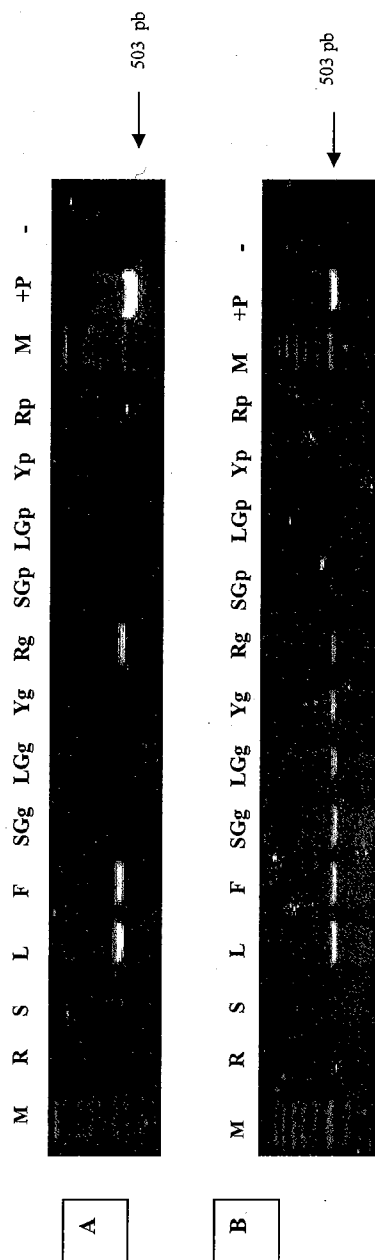


Figure 12: RT-PCR analysis of the expression of CcCPI-4 gene in different tissues of *Coffea arabica* CCA2 (Panel A) and of *Coffea robusta* FRT-32 (Panel B)

ARABICA

R S L F SG (G) SG (P) LG (G) LG (P) Y (G) Y (P) Red (G) Red (P)

rRNA (A)



CcAP-2 (B)

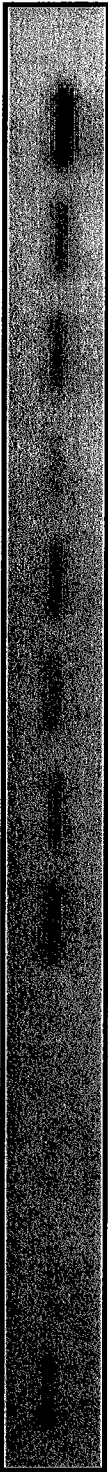


Figure 13: Northern blot analysis of the expression of the aspartic proteinase 2 (CcAP2) gene in different tissues of *Coffea arabica*.

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1 M K M G K A F L F A V V L A V I
144 TTA GTG GCG GCT ATG AGC ATG GAG ATC ACA GAA AGA GAT TTG GCT TCT GAG GAA AGC TTG
17 L V A A M S M E I T E R D L A S E E S L
204 TGG GAC TTG TAC GAA AGA TGG AGG AGC CAT CAT ACT GTT TCT CGA GAC CTT TCT GAG AAA
37 W D L Y E R W R S H T V S R D L S E K
264 CGA AAG CGC TTT AAT GTT TTC AAG GCA AAT GTC CAT CAC ATT CAC AAG GTG AAC CAG AAG
57 R K R F N V F K A N V H H I H K V N Q K
324 GAC AAG CCT TAC AAG CTG AAA CTC AAC AGT TTC GCT GAT ATG ACC AAC CAC GAG TTC AGG
77 D K P Y K L K L N S F A D M T N H E F R
384 GAA TTC TAC AGT TCT AAG GTG AAA CAT TAC CGG ATG CTC CAC GGC AGT CGT GCT AAT ACT
97 E F Y S S K V K H Y R M L H G S R A N T
444 GGA TTT ATG CAT GGG AAG ACT GAA AGT TTG CCA GCC TCC GTT GAT TGG AGA AAG CAA GGA
117 G F M H G K T E S L P A S V D W R K Q G
504 GCC GTG ACT GGC GTC AAG AAT CAA GGC AAA TGT GGT AGC TGT TGG GCA TTT TCA ACT GTG
137 A V T G V K N Q G K C G S C W A F S T V
564 GTT GGA GTC GAG GGA ATC AAC AAA ATC AAA ACA GGC CAA TTA GTT TCT CTG TCC GAG CAA
157 V G V E G I N K I K T G Q L V S L S E Q
624 GAA CTT GTT GAC TGT GAA ACG GAC AAT GAA GGA TGC AAC GGA GGA CTC ATG GAA AAT GCA
177 E L V D C E T D N E G C N G G L M E N A
684 TAC GAG TTT ATT AAG AAA AGT GGG GGA ATA ACA ACT GAG AGG CTA TAT CCC TAC AAG GCA
197 Y E F I K K S G G I T T E R L Y P Y K A
744 AGA GAT GGC AGC TGT GAT TCG TCA AAG ATG AAT GCC CCT GCT GTG ACT ATT GAT GGG CAT
217 R D G S C D S S K M N A P A V T I D G H
804 GAA ATG GTA CCC GCA AAC GAT GAG AAT GCC TTG ATG AAA GCT GTT GCT AAC CAG CCT GTA
237 E M V P A N D E N A L M K A V A N Q P V
864 TCA GTA GCT ATA GAT GCG TCT GGC TCT GAC ATG CAA TTT TAT TCA GAG GGT GTA TAC GCT
257 S V A I D A S G S D M Q F Y S E G V Y A
924 GGA GAC TCG TGT GGC AAT GAG CTT GAT CAT GGC GTG GCG GTC GTC GGC TAC GGG ACT GCT
277 G D S C G N E L D H G V A V V G Y G T A
984 CTT GAG GGT ACT AAA TAC TGG ATA GTG AAG AAC TCA TGG GGA ACA GGA TGG GGA GAA CAG
297 L D G T K Y W I V K N S W G T G W G E Q
1044 GGC TAT ATC AGG ATG CAA CGT GGT GTT GAT GCT GCT GAA GGC GGA GTT TGT GGG ATA GCA
317 G Y I R M Q R G V D A A E G G V C G I A
1104 ATG GAG GCC TCC TAT CCA CTT AAA TTG TCC TCC CAC AAT CCA AAA CCA TCC CCA CCT AAG
337 M E A S Y P L K L S S H N P K P S P P K
1164 GAC GAC CTC TAG attgatcctcttatatatatatacatatatatatatttcagtagattcattgaattttagttac
357 D D L *
1240 agactacgcgttcTGaagacttagatcatctctagggcatagatttatgtaacctcgtcctcgtgatggtttgaataaac
1320 aataagtagtactaataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa (SEQ. ID NO: 15)
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Figure 14: cDNA sequence and its deduced amino acid sequence of CcCP-4. Lowercase: 5' and 3' non-translated regions; Uppercase: Open reading frame; Bold character: amino acid sequence; *: stop codon.

REPLACEMENT DRAWING



Decoration 'Decoration #1': Shade (with solid black) residues that match KDDL -CcCP4 exactly. □

Figure 16. The full length cDNA sequence CcCP-4 KDDL and the partial cDNA sequence CcCP-4 (KDEL).

Decoration 'Decoration #1': Shade (with solid black) residues that match CcCP-4 KDDL exactly. □

Figure 17. The complete open reading frame of CcCP-4 (KDDL) and the partial open reading frame of CcCP-4 (KDEL).

Figure 18. DNA sequence chromatograms for PCR amplified genomic DNA encoding the KDEL/KDDL region of the CcCP-4 gene.

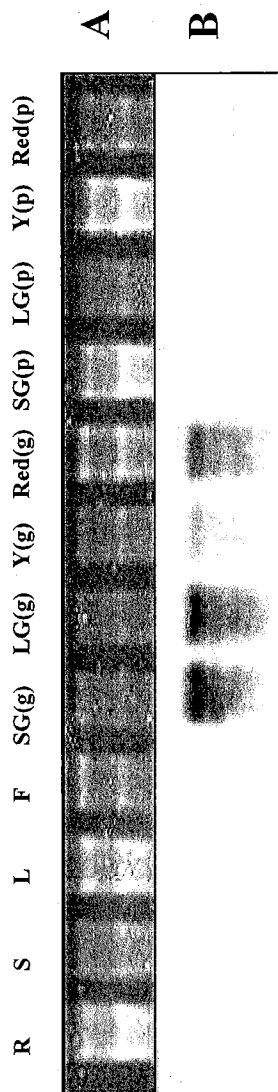


Figure 19. Northern blot analysis of the expression of the Cysteine proteinase CcCP-4 gene in different tissues of *Coffea arabica*.

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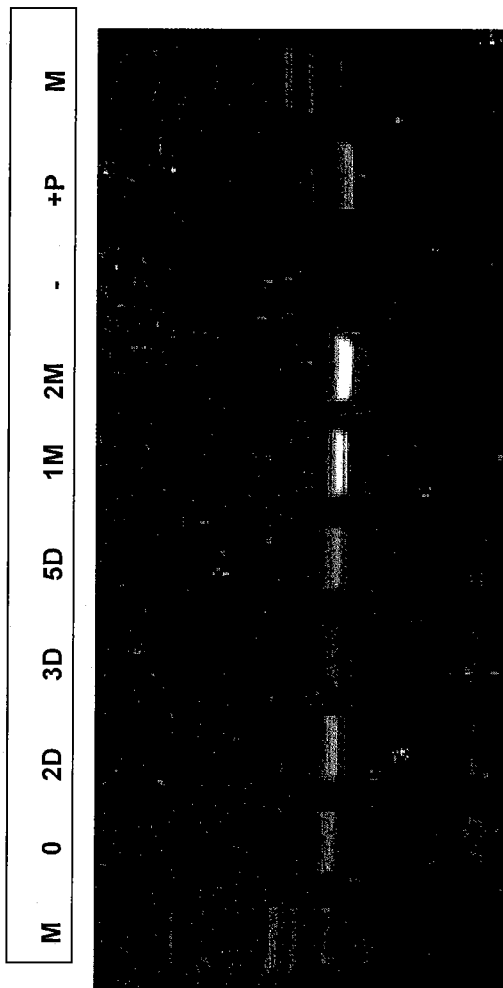


Figure 20. RT-PCR analysis of the expression of CcCP-4 in the whole grain during germination.

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1 A P A T h n (A Y 0 9 9 6 1)
1 A P A T h n (B A B 0 9 3 5 6)
29 T P P Q D Y Y V Q V D T G S D I L W N C A G C V R C P K K S L G I D L T L Y D M K A S S T G R L V T C D Q D F C L S A F N A P A S D C K V G N P C A V S T T Y CcAPI
1 A P A T h n (A Y 0 9 9 6 1)
82 S F P K E Y Y V Q V D T G S D I L W N C A P C P K C P V K T D L G I P L S L Y D S K T S S T S K N V G C E D D F C S - F I M Q S E T C G A K K P C S Y H V V Y A P A T h n (B A B 0 9 3 5 6)
110 G D G S S T G G Y F V R D Y A K L N Q L T G N L Q T I P M N G S I V F G C S S Q S S G E L G S S T E A V D G I L G F G Q A N S S I S Q L A S A G K V K K F F S H CcAPI
3 G D G S S T G G Y F V R D Y A K L N Q L T G N L Q T I P M N G S I V F G C S S Q S S G E L G S S T E A V D G I L G F G Q A N S S I S Q L A S A G K V K K F F S H A P A T h n (A Y 0 9 9 6 1)
161 G D G S S T G G Y F V R D Y A K L N Q L T G N L Q T I P M N G S I V F G C S S Q S S G E L G S S T E A V D G I L G F G Q A N S S I S Q L A S A G K V K K F F S H A P A T h n (B A B 0 9 3 5 6)
191 C L D G I N G G G I F A I G Q V V Q P K L K T T P L V P N E A H Y N V V L N A I E V G G D V L N L P S D V L G G G S G S G T I I D S G T T L A Y L P D D V Y I P L CcAPI
84 C L D R N N G G G I F A V G E V S P K V K T I P M E S K S A H Y S V N L N A I E V G S V L E L S R N A F D S G D D K K G V I I D S G T T L V Y L P D A V Y N P L A P A T h n (A Y 0 9 9 6 1)
242 C L D N M N G G G I F A V G E V S P K V K T I P P N Q V H Y N V I R G M D V D G D P I D L P P S L A S I N G D G G T I I D S G T T L A Y L P Q N L Y N S L A P A T h n (B A B 0 9 3 5 6)
272 M E K I T A S Q S N L K L H I V E N Q F K C F V Y S Q N V D G E P V V X F H F E D S L S L I T V Y P H E Y L F D L H D Q Q W C L G W Q N K G V Q T R D G R E V T L CcAPI
165 L N S I L A S H P E L L H T V G E F T C F H Y T D K L D R - F P P V N F Q F D K S V S L K A V V P R E Y L F Q V R E I H C F G W Q N G G T I K G G R S L T L A P A T h n (A Y 0 9 9 6 1)
333 I E K I T A K Q Q V K L H M V Q E T F A C F S F L S N T D K A F P V N L H F E D S E K L S V V P R D Y L F F L R E D M T C F G W Q S G G M T I Q D G A D V I L A P A T h n (B A B 0 9 3 5 6)
353 L G D L V L A N K L V S Y D L E N Q I I G W A E Y N C S S I K L R D E K S G N V V A V G S H - I L S S A R G L N A G K A R E L L I I T S L L H A L L I P CcAPI
245 L G D M A L S N K L V V Y D L E N Q V I G W T N H N C S G G I Q V K D E F S G A I Y T V G A H - N L S W S S L A I T K L T L V S L I I P F F C N V A L A P A T h n (A Y 0 9 9 6 1)
403 L G D L V L S N K L V V Y D L E N E V I G W A D H N C S S I K V K D G - S G A A Y Q L G A E N L T S A S S V M N G T L V T L L S F L I W V F H S F T S A P A T h n (B A B 0 9 3 5 6)

CcAPI (SEQ ID NO: 88)
AP A Thn (AY099617) (SEQ ID NO: 89)
AP A thn (BAB09356) (SEQ ID NO: 90)

Figure 21: Optimal alignment of the complete protein encoded by CcAP-1 cDNA with other homologous full-length aspartic proteinase sequences available in the NCBI.

Title: Polynucleotide Sequence Encoding Cysteine Protease for Modulation
of Coffee Flavour Precursor Levels in Green Coffee Grains (*as modified*)
Inventor: McCarthy, et al.
App. No.: 10/559,986
Docket No.: 112701-667
REPLACEMENT DRAWING

1	MER	R	Y	L	W	A	A	F	V	L	G	A	I	V	C	S	L	F	P	L	P	S	E	G	-	-	L	K	R	I	S	L	K	K	K	P	L	D	I	Q	S	I	R	A	A	K	L	A	H	L	E	S	T	H	G	A	G	R	K	E	M	-	D	N	N	L	CcAP2			
1	M	G	Q	K	H	L	V	T	V	F	C	L	W	A	L	T	C	S	L	P	S	F	S	E	G	-	-	I	L	R	I	G	L	K	K	R	P	L	D	I	S	I	N	A	A	R	K	A	R	E	G	L	R	S	V	R	P	M	M	G	A	H	D	Q	F	G	max			
1	M	G	R	K	Y	L	C	N	A	E	L	L	W	A	V	C	T	A	L	P	A	S	D	N	-	-	L	R	V	G	L	K	K	R	P	L	D	I	E	S	I	K	A	A	K	G	A	R	L	G	G	K	Y	G	K	G	V	N	-	-	K	K	L	I	. batatas					
1	M	D	K	H	L	C	A	L	L	L	W	A	I	A	C	S	A	L	P	A	S	S	G	D	-	-	L	F	R	I	G	L	K	K	R	H	R	L	D	V	D	S	I	K	A	A	R	V	A	K	L	Q	D	R	G	L	K	R	F	-	Q	Y	S	F	N	. alata N				
1	N	G	H	R	N	L	W	V	I	F	C	F	C	A	L	I	S	C	F	F	S	A	D	G	-	-	L	V	R	I	G	L	K	K	R	Q	F	S	D	S	N	S	I	R	A	V	R	I	A	R	K	A	G	M	N	-	Q	E	L	K	R	F	-	Q	Y	S	F	N	. alata N	
66	G	S	S	N	-	E	D	I	L	P	L	K	N	Y	L	D	A	Q	Y	Y	G	E	I	G	I	G	T	P	Q	K	F	T	V	I	F	E	D	T	G	S	S	N	L	W	P	S	A	K	C	Y	F	S	I	A	C	W	L	H	S	K	Y	K	A	K	K	S	CcAP2			
67	G	K	S	K	G	E	D	I	V	P	L	K	N	Y	L	D	A	Q	Y	Y	G	E	I	G	I	G	T	P	Q	K	F	T	V	I	F	E	D	T	G	S	S	N	L	W	P	S	S	K	C	Y	F	T	L	A	C	Y	T	H	N	W	Y	T	A	K	K	S	K	G	max	
66	G	D	S	D	-	E	G	I	V	S	L	N	N	Y	L	D	A	Q	Y	Y	G	E	I	G	S	P	P	Q	K	F	T	V	I	F	E	D	T	G	S	S	N	L	W	P	S	S	K	C	Y	F	S	I	A	C	M	I	H	S	K	Y	K	S	K	S	I	. batatas				
65	S	D	S	D	-	I	Y	K	V	P	L	K	N	Y	L	D	A	Q	Y	Y	G	E	I	G	S	P	P	Q	K	F	T	V	I	F	E	D	T	G	S	S	N	L	W	P	S	S	K	C	Y	F	S	I	A	C	M	I	H	S	K	Y	K	S	K	S	L	. esculen				
65	G	D	S	D	-	T	D	I	V	Y	L	K	N	Y	L	D	A	Q	Y	Y	G	E	I	G	S	P	P	Q	K	F	T	V	I	F	E	D	T	G	S	S	N	L	W	P	S	S	K	C	Y	F	S	I	A	C	M	I	H	S	K	Y	K	S	K	S	N	. alata N				
133	T	Y	T	A	I	G	K	S	C	S	I	R	Y	G	S	G	S	I	S	G	E	S	Q	D	N	V	E	V	G	D	L	V	V	K	D	Q	V	F	I	E	A	S	R	E	G	S	L	T	F	V	I	A	K	F	D	G	I	L	G	L	G	F	Q	E	I	A	V	CcAP2		
135	T	H	V	K	N	G	T	S	C	K	I	N	Y	G	T	G	S	I	S	G	F	L	S	Q	D	N	V	K	V	G	S	A	V	V	K	H	Q	D	F	I	E	A	T	H	E	G	S	L	T	F	L	S	A	K	F	D	G	I	L	G	L	G	F	Q	E	I	S	V	G	max
132	T	Y	T	Q	I	G	K	S	C	S	I	T	Y	G	S	V	S	I	S	G	F	L	S	Q	D	N	V	K	L	V	K	D	Q	V	F	I	E	T	R	E	P	S	L	T	F	T	A	K	F	D	G	I	L	G	L	G	F	Q	E	I	S	V	I	. batatas						
133	T	Y	T	R	D	G	E	S	C	S	I	R	Y	G	T	G	S	I	S	G	H	F	S	M	D	N	V	Q	V	G	D	L	V	K	D	Q	V	F	I	E	A	T	R	E	P	S	L	T	F	I	V	A	K	F	D	G	I	L	G	L	G	F	Q	E	I	S	V	L	. esculen	
132	T	Y	T	R	I	G	K	S	C	E	I	D	Y	G	S	G	S	I	S	G	F	S	Q	D	I	V	E	V	G	N	L	A	V	K	N	Q	V	F	I	E	A	S	R	E	K	S	L	T	F	A	L	A	K	F	D	G	I	L	G	L	G	F	Q	E	I	S	V	N	. alata N	
201	D	N	M	V	P	V	W	Y	N	M	V	D	Q	G	L	V	D	E	Q	V	F	S	F	M	L	N	R	D	P	N	A	E	D	G	G	E	L	V	F	G	G	V	D	T	N	H	F	K	G	K	H	T	Y	V	P	T	E	K	G	Y	W	Q	F	K	M	G	D	CcAP2		
203	E	N	A	V	P	V	W	E	K	M	V	E	Q	K	L	I	S	E	K	V	F	S	F	M	L	N	G	D	P	N	A	K	K	G	G	E	L	V	F	G	G	V	D	P	K	H	F	K	G	N	H	T	Y	V	P	T	E	K	G	Y	W	Q	F	E	M	G	D	G	max	
200	E	N	V	P	V	W	T	D	M	V	E	Q	G	L	V	D	E	F	V	F	S	F	M	L	N	R	D	P	K	A	E	K	K	G	E	L	V	F	G	G	V	D	P	K	H	F	K	G	E	H	T	Y	V	P	T	E	K	G	Y	W	Q	I	D	L	G	D	I	. batatas		
201	G	N	T	T	P	V	W	Y	N	M	V	G	Q	G	L	V	K	E	P	V	F	S	F	M	F	N	R	D	A	N	A	K	E	G	E	L	V	F	G	G	V	D	P	K	H	F	K	G	N	H	T	C	V	P	L	T	Q	K	G	Y	W	Q	F	N	M	G	D	L	. esculen	
200	G	D	V	P	V	W	Y	N	M	V	E	Q	G	L	V	K	E	P	V	F	S	F	M	F	N	R	D	P	K	A	K	I	G	G	E	I	V	F	G	G	I	D	E	K	H	F	V	G	E	H	T	Y	V	P	T	R	K	G	Y	W	Q	F	E	M	G	N	. alata N			
269	F	L	I	G	N	V	S	T	G	F	C	E	G	G	C	A	A	I	V	D	S	G	T	S	L	L	A	G	P	T	T	V	T	Q	I	N	H	A	I	G	A	E	G	V	S	T	E	C	K	E	I	V	S	Q	Y	G	E	L	I	W	D	L	L	V	S	G	CcAP2			
271	F	E	V	G	V	S	T	G	V	C	E	G	G	C	A	A	I	V	D	S	G	T	S	L	L	A	G	P	T	P	V	A	E	I	N	H	A	I	G	A	E	G	V	L	S	V	E	C	K	E	V	S	Q	Y	G	E	L	I	W	D	L	L	V	S	G	G	max			
268	F	L	I	G	N	S	T	G	Y	C	E	G	G	C	A	A	I	V	D	S	G	T	S	L	L	A	G	P	T	I	V	T	E	I	N	H	A	I	G	A	E	G	V	L	S	V	E	C	K	E	V	S	Q	Y	G	E	M	I	W	D	L	L	V	S	G	I	. batatas			
268	F	L	I	G	N	I	S	T	G	F	C	E	G	G	C	A	A	I	V	D	S	G	T	S	L	L	A	G	P	T	I	V	T	E	I	N	H	A	I	G	A	E	G	V	L	S	V	E	C	K	E	V	S	Q	Y	G	E	M	I	W	D	L	L	V	S	G	L	. esculen		
337	V	L	P	D	R	V	C	K	Q	A	G	L	C	P	L	R	G	A	O	H	E	N	A	Y	I	K	S	V	V	D	E	E	N	K	E	A	S	V	G	E	S	P	M	C	T	A	C	E	M	A	V	W	M	Q	N	Q	L	K	Q	G	T	K	E	K	V	CcAP2				
339	V	K	P	D	I	C	S	Q	V	G	L	C	S	S	K	R	H	Q	S	K	S	A	G	I	E	M	V	T	E	K	E	Q	-	E	E	L	A	A	R	D	T	P	L	C	S	S	C	Q	M	L	V	I	M	I	Q	N	Q	L	K	Q	A	T	K	D	R	V	G	max		
336	T	R	A	D	Q	V	C	S	E	L	G	L	C	F	L	N	G	A	M	H	E	S	I	I	K	T	V	V	E	K	E	A	-	E	G	-	N	L	T	S	N	P	L	C	T	T	C	E	M	A	V	W	M	Q	N	Q	L	K	Q	G	I	K	E	K	V	I	. batatas			
337	I	R	P	D	V	C	S	Q	A	G	L	C	F	L	D	G	S	Q	H	V	S	S	N	I	R	T	V	V	E	R	E	T	-	E	G	S	S	V	G	E	A	P	L	C	T	A	C	E	M	A	V	W	M	Q	N	Q	L	K	Q	E	Q	T	K	E	K	V	L	. esculen		
336	V	Q	P	D	K	I	C	S	Q	L	A	L	C	F	N	-	D	A	Q	F	L	S	I	G	I	K	T	V	I	E	R	E	N	R	K	N	S	S	V	A	D	D	F	L	C	T	A	C	E	M	A	V	W	I	Q	N	Q	L	R	R	E	V	T	K	E	K	V	N	. alata N	
405	L	A	Y	V	N	Q	L	C	E	S	I	P	S	P	M	G	E	S	I	I	D	C	N	S	L	S	T	L	P	N	V	S	F	T	I	G	K	S	F	E	L	T	L	K	E	Y	V	L	R	T	G	E	G	F	A	E	V	C	I	S	G	F	M	A	M	D	V	CcAP2		
406	F	N	I	V	N	Q	L	C	E	S	I	P	S	P	M	G	E	S	V	I	D	C	N	S	L	S	K	M	P	N	I	T	F	T	I	G	N	K	P	F	V	L	T	P	E	Q	Y	I	L	R	T	G	E	G	I	T	E	V	C	L	S	G	F	I	A	F	D	V	I	. batatas
402	F	E	Y	V	N	Q	L	C	E	K	L	P	S	P	M	G	E	S	V	I	D	C	N	S	I	S	S	M	P	N	V	T	F	T	I	G	N	K	P	F	V	L	T	P	E	Q	Y	I	L	R	T	G	E	G	I	A	A	V	C	V	S	G	F	I	A	L	D	V	I	. batatas
404	L	E	Y	V	N	Q	L	C	E	K	I	P	S	P	M	G	E	S	A	I	D	C	N	R	I	S	S	M	P	D	I	T	F	T	I	K	D	T	A	F	V	L	T	P	E	Q	Y	I	L	K	T	G	E	G	V	A	T	I	C	V	S	G	F	A	L	D	V	I	. esculen	
403	L	N	Y	I	N	E	L	C	D	S	L	P	S	P	M	G	E	S	V	I	D	C	D	S	I	P	Y	M	P	N	V	T	F	T	I	G	E	K	P	F	K	L	T	P	E	Q	Y	I	V	L	K	A	G	E	G	D	A	M	V	C	L	S	G	F	I	A	L	D</		